CLAIMS:

1. Longitudinally pumped laser comprising one or more active lasing media arranged in an optical cavity and at least one pumping means (4) emitting at least one pumping beam toward the active lasing medium or media (3), means (5) for the coupling of the pumped beam or beams with the active medium, characterized in that at least one of the active lasing media comprises one or more non-homogeneously doped zones (8) and in that the dimension of said doped zones (8) and/or the distribution of the dopants is chosen on the basis of the desired transverse mode of the laser cavity.

2. Laser according to claim 1 characterized in that the doped zone (8) is positioned substantially centrally in the active medium (3), its dimensions are adapted to the fundamental mode of the laser cavity or to the transverse mode and in that the non-doped peripheral zone has dimensions adapted to the coupling means (5).

3. Laser according to one of the claims 1 or 2, characterized in that the section s_d of the input face of the doped zone that receives the pump beam is smaller than or equal to the section s_m of the fundamental mode of the cavity.

4. Laser according to one of the claims 1 or 2, characterized in that the section s_d of the input face of the doped zone that receives the pump beam is at least greater than the section s_m of the fundamental mode of the cavity, the laser cavity comprising a selection device.

5. Laser according to claim 1, characterized in that the active medium (3) comprises a non-doped central zone surrounded by a doped peripheral zone.

6. Laser according to one of the above claims, characterized in that the doped zone has a parallelepiped or circular or elliptical shape.

7. Laser according to one of the claims 1 to 6, characterized in that said one or more pumping means (4) comprise one or more diode arrays and the coupling means (5) consist of a light concentrator adapted to receiving all the light emitted by the diode arrays.

8. Laser according to one of the claims 1 to 6, characterized in that said coupling means comprise for example at least one of the devices chosen from the following list: a refractive focusing system or a diffractive focusing

system, or a system working by reflection or a system for reshaping the extent of a beam.

9. Laser according to claim 1, characterized in that the distribution of the dopants in the active medium is made according to a gradient.

10. Laser according to one of the above claims, characterized in that the dopants are chosen from among one or more of the ions of the following list: : (Nd^{3+}, Yb^{3+}, Er^{3+}, Ho^{3+}, Th^{3+},...).

11. Laser according to one of the above claims, characterized in that the face of the active medium facing the coupling means is treated so as to be anti-reflective at the pumping wavelength and reflective at the laser wavelength, and the opposite face of the active medium is treated so as to be anti-reflective at the laser wavelength.

12. Method for the manufacture of an active medium used in lasers, characterized in that it comprises at least one step for the making of one or more pieces of a doped matrix and a non-doped matrix so as to obtain an active medium comprising one or more zones or volumes having a dimension and/or a distribution of the dopants chosen to obtain a transverse mode of the laser cavity.

13. Method of manufacture according to claim 12 characterized in that the manufacturing step is a step of joining by gluing, molecular adhesion or diffusion bonding.

14. Method of manufacture according to claim 12, characterized in that the manufacturing step is a step for preforming a step-index fiber or for preforming a fiber with a graded index of dopants.

15. Use of the laser according to one of the claims 1 to 11 to amplify one or more laser beams.

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